

Unit Planning Guide: Grade 7 Unit 1 of 7

Unit Title: Operations on Rational Numbers	Pacing (Duration of Unit): 5 weeks
Grade: 7	Buffer Day(s): 5 days

Desired Results

Transfer Goals (Priority practice standards in **bold**)

Students will be able to independently use their learning to:

- MP.1. **Make sense of problems and persevere in solving them.**
- MP.2. **Reason abstractly and quantitatively.**
- MP.3. Construct viable arguments and critique the reasoning of others.
- MP.4. Model with mathematics.
- MP.5. Use appropriate tools strategically.
- MP.6. **Attend to precision.**
- MP.7. Look for and make use of structure.
- MP.8. Look for and express regularity in repeated reasoning.

Established Goals (2011 MA Curriculum Frameworks Standards Incorporating the Common Core State Standards)

Prerequisite Standards:

- 6.NS.1: Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for $(\frac{2}{3}) \div (\frac{3}{4})$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $(\frac{2}{3}) \div (\frac{3}{4}) = \frac{8}{9}$ because $\frac{3}{4}$ of $\frac{8}{9}$ is $\frac{2}{3}$. (In general, $(\frac{a}{b}) \div (\frac{c}{d}) = \frac{ad}{bc}$.) How much chocolate will each person get if 3 people share $\frac{1}{2}$ lb of chocolate equally? How many $\frac{3}{4}$ -cup servings are in $\frac{2}{3}$ of a cup of yogurt? How wide is a rectangular strip of land with length $\frac{3}{4}$ mi and area $\frac{1}{2}$ square mi?*
- 6.NS.3: Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
- 6.NS.5: Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
- 6.NS.6a: Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite.

WIDA for English Language Learners

Standard 1: ELLs **communicate** for **Social** and **Instructional** purposes within the school setting

Standard 3: ELLs **communicate** information, ideas and concepts necessary for academic success in the content area of **Mathematics**

In the lesson planning stage, teachers will need to differentiate lessons for ELLs. In order to accomplish this they will need: 1.) this curriculum map, 2.) a list of their ELLs and their proficiency levels, and 3.) appropriate language function expectations and scaffolds or supports.

Unit Planning Guide: Grade 7 Unit 1 of 7

- 6.NS.7c: Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of -30 dollars, write $|-30| = 30$ to describe the size of the debt in dollars.*

Standards (Priority Standards in **bold**):

- 7.NS.1: Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
 - 7.NS.1a: Describe situations in which opposite quantities combine to make 0.
 - 7.NS.1b: Understand $p + q$ as the number located a distance $|q|$ from p , in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
 - 7.NS.1c: Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
 - 7.NS.1d: Apply properties of operations as strategies to add and subtract rational numbers.
- 7.NS.2: Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
 - 7.NS.2a: Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
 - 7.NS.2b: Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.
 - 7.NS.2c: Apply properties of operations as strategies to multiply and divide rational numbers.
- **7.NS.3: Solve real-world and mathematical problems involving the four operations with rational numbers**

Meaning (*Mostly assessed through Performance Tasks/Assessments)

Unit Planning Guide: Grade 7 Unit 1 of 7

<p>Big Ideas: (Statements and concepts written in teacher friendly language which reflect the important [but not obvious] generalizations we want students to be able to arrive at. These are used by the teacher to focus daily instruction.)</p> <ul style="list-style-type: none"> Real world mathematical problems can be solved using rational numbers and an appropriately selected operation(s). Properties and operations can be used to solve real world rational numbers. Rational numbers can be converted to aid in comparison of size. 	<p>Essential Questions: (Questions which frame ongoing and important inquiries about the big ideas. They are written for students and used in daily instruction to help engage students in meaningful thinking.)</p> <ul style="list-style-type: none"> What applications do rational numbers have in society? How do we use rational numbers to solve problems? Why do we use rational numbers?
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Acquisition (*Mostly assessed through traditional summative assessments)	
<p>Knowledge: Key basic concepts, facts, and key terms (written in phrases) students should be able to recall independently.</p> <p><i>Students will know ...</i></p> <ul style="list-style-type: none"> That the commutative property is closed in the set real numbers under addition and multiplication. That the associative property is closed in the set of real numbers under addition and multiplication. The distributive property is closed in the set of real numbers under addition and subtraction. The identity property of addition and multiplication That rational numbers can be written as fractions and as decimals that terminate or repeat. That opposite quantities combine to make 0. Know that the absolute value of a number is its distance from zero on the number line. Know that two rational numbers on the real number line have a distance that is equal to the absolute value of their difference. 	<p>Skills: The discrete skills and process students should be able to use independently.</p> <p><i>Students will be skilled at:</i></p> <ul style="list-style-type: none"> Identifying and classifying rational numbers Applying the concept of absolute value of rational numbers in real world context. Adding and subtracting rational numbers (integers, decimals and fractions), including using a number line. Identifying and using properties of rational numbers Using the additive inverse to subtract rational numbers Identifying and placing rational numbers on vertical and horizontal number lines Multiplying and dividing rational numbers (integers, decimals and fractions) Applying the properties of operations Recognizing and applying the distributive property Converting rational numbers into decimals Identifying the appropriate operation by using key words in real-world problems Describing situations in which opposite quantities combine to make 0. Interpreting sums, differences, products and quotients of rational numbers by describing real-world contexts.

Unit Planning Guide: Grade 7 Unit 1 of 7

Key Academic Vocabulary:

- Rational Number
 - Absolute Value
- Additive Inverse

- Solving real-world problems involving rational numbers

Resource Suggestions: